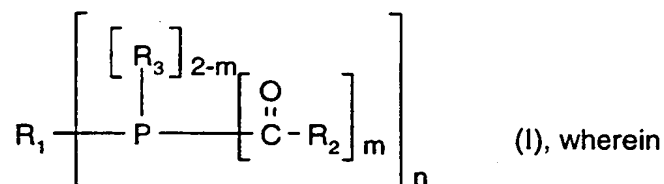


What is claimed is

1. A process for the preparation of acyl phosphines of formula I



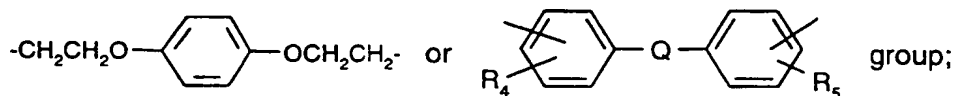
**n** and **m** are each independently of the other 1 or 2;

**R<sub>1</sub>**, if **n** = 1, is

C<sub>1</sub>-C<sub>18</sub>alkyl, C<sub>2</sub>-C<sub>18</sub>alkyl which is interrupted by one or several non-successive O atoms; phenyl-substituted C<sub>1</sub>-C<sub>4</sub>alkyl, C<sub>2</sub>-C<sub>8</sub>alkenyl, phenyl, naphthyl, biphenyl, C<sub>5</sub>-C<sub>12</sub>cycloalkyl or a 5- or 6-membered O-, S- or N-containing heterocyclic ring, the radicals phenyl, naphthyl, biphenyl, C<sub>5</sub>-C<sub>12</sub>cycloalkyl or the 5- or 6-membered O-, S- or N-containing heterocyclic ring being unsubstituted or substituted by one to five halogen, C<sub>1</sub>-C<sub>8</sub>alkyl, C<sub>1</sub>-C<sub>8</sub>alkylthio and/or C<sub>1</sub>-C<sub>8</sub>alkoxy;

**R<sub>1</sub>**, if **n** = 2, is

C<sub>1</sub>-C<sub>18</sub>alkylene, C<sub>2</sub>-C<sub>18</sub>alkylene which is interrupted by one or several non-successive O atoms; or **R<sub>1</sub>** is C<sub>1</sub>-C<sub>6</sub>alkylene which is substituted by C<sub>1</sub>-C<sub>4</sub>alkoxy, phenyl, C<sub>1</sub>-C<sub>4</sub>alkylphenyl, phenyl-C<sub>1</sub>-C<sub>4</sub>alkyl or C<sub>1</sub>-C<sub>4</sub>alkoxyphenyl; or **R<sub>1</sub>** is phenylene or xylylene, which radicals are unsubstituted or substituted by one to three C<sub>1</sub>-C<sub>4</sub>alkyl and/or C<sub>1</sub>-C<sub>4</sub>alkoxy, or **R<sub>1</sub>** is a



**R<sub>2</sub>** is C<sub>1</sub>-C<sub>18</sub>alkyl, C<sub>3</sub>-C<sub>12</sub>cycloalkyl, C<sub>2</sub>-C<sub>18</sub>alkenyl, phenyl, naphthyl, biphenyl or a 5- or 6-membered O-, S- or N-containing heterocyclic ring, the radicals phenyl, naphthyl, biphenyl or 5- or 6-membered O-, S- or N-containing heterocyclic ring being unsubstituted or substituted by one to four C<sub>1</sub>-C<sub>8</sub>alkyl, C<sub>1</sub>-C<sub>8</sub>alkoxy, C<sub>1</sub>-C<sub>8</sub>alkylthio and/or halogen;

**R<sub>3</sub>** is C<sub>1</sub>-C<sub>18</sub>alkyl, C<sub>2</sub>-C<sub>18</sub>alkyl which is interrupted by one or several non-successive O atoms; phenyl-substituted C<sub>1</sub>-C<sub>4</sub>alkyl, C<sub>2</sub>-C<sub>8</sub>alkenyl, phenyl, naphthyl, biphenyl, C<sub>5</sub>-C<sub>12</sub>cycloalkyl or a 5- or 6-membered O-, S- or N-containing heterocyclic ring, the radicals

phenyl, naphthyl, biphenyl, C<sub>5</sub>-C<sub>12</sub>cycloalkyl or the 5- or 6-membered O-, S- or N-containing heterocyclic ring being unsubstituted or substituted by one to five halogen, C<sub>1</sub>-C<sub>8</sub>alkyl, C<sub>1</sub>-C<sub>8</sub>alkylthio and/or C<sub>1</sub>-C<sub>8</sub>alkoxy;

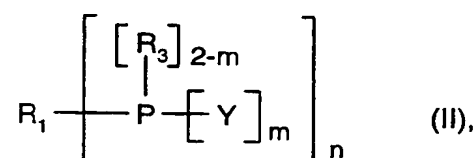
**Q** is a single bond, CR<sub>6</sub>R<sub>7</sub>, -O- or -S-;

**R<sub>4</sub>** and **R<sub>5</sub>** are each independently of the other hydrogen, C<sub>1</sub>-C<sub>4</sub>alkyl or C<sub>1</sub>-C<sub>4</sub>alkoxy;

**R<sub>6</sub>** and **R<sub>7</sub>** are each independently of the other hydrogen or C<sub>1</sub>-C<sub>4</sub>alkyl;

by

(1) reacting organic phosphorus halides of formula II

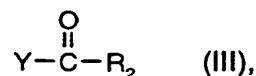


wherein **R<sub>1</sub>**, **R<sub>3</sub>**, **n** and **m** have the meaning cited above,

and **Y** is Br or Cl,

with an alkali metal or with magnesium in combination with lithium, or with mixtures thereof, where appropriate in the presence of a catalyst, and

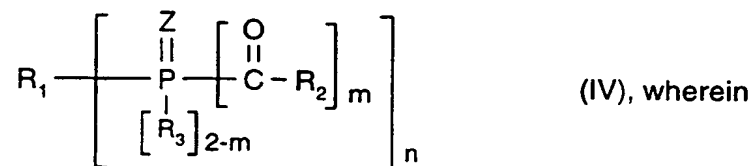
(2) subsequent reaction with **m** acid halides of formula III



wherein **R<sub>2</sub>**, **Y** and **m** have the meaning cited above;

which process is carried out without isolation of the intermediates.

2. A process for the preparation of acylphosphine oxides and acylphosphine sulfides of formula IV

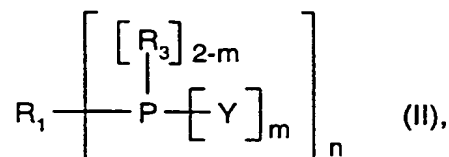


**R<sub>1</sub>**, **R<sub>2</sub>**, **R<sub>3</sub>**, **n** and **m** have the meaning cited in claim 1, and

**Z** is O or S,

by

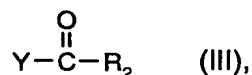
(1) reacting organic phosphorus halides of formula II



wherein  $R_1$ ,  $R_3$ ,  $Y$ ,  $n$  and  $m$  have the meaning cited in claim 1,

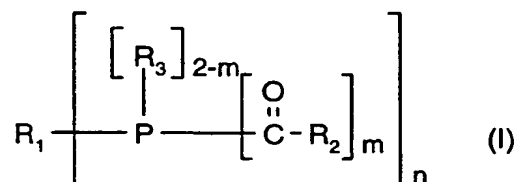
with an alkali metal or with magnesium in combination with lithium, or with mixtures thereof, where appropriate in the presence of a catalyst, and

(2) subsequent reaction with  $m$  acid halides of formula III



wherein  $R_2$ ,  $m$  and  $Y$  have the meaning cited in claim 1, and

(3) oxidation or reaction with sulfur of the acylphosphine of formula I



which is obtained by reaction (2),

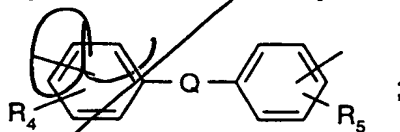
wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $m$  and  $n$  have the meaning cited in claim 1,

which process is carried out without isolation of the intermediates.

3. A process according to either claim 1 or claim 2, wherein

$R_1$ , if  $n = 1$ , is  $C_1$ - $C_{12}$ alkyl, cyclohexyl, phenyl or biphenyl, the radicals phenyl and biphenyl being unsubstituted or substituted by one to four  $C_1$ - $C_8$ alkyl and/or  $C_1$ - $C_8$ alkoxy;

$R_1$ , if  $n = 2$ , is  $C_6$ - $C_{10}$ alkylene, or



$R_3$  is  $C_1$ - $C_{12}$ alkyl, cyclohexyl, phenyl or biphenyl, the radicals phenyl and biphenyl being unsubstituted or substituted by one to four  $C_1$ - $C_8$ alkyl and/or  $C_1$ - $C_8$ alkoxy;

$Q$  is a single bond or  $-O-$ , and

$R_4$  and  $R_5$  are hydrogen.

4. A process according to either claim 1 or claim 2, wherein  $R_2$  is phenyl which is substituted in 2,6- or 2,4,6-position by  $C_1$ - $C_4$ alkyl and/or  $C_1$ - $C_4$ alkoxy.
5. A process according to either claim 1 or claim 2, wherein  $n$  is 1.
6. A process according to either claim 1 or claim 2, wherein  $Y$  in formula II is chloro.
7. A process according to either claim 1 or claim 2, wherein the reaction (1) is carried out using lithium, sodium or potassium.
8. A process according to claim 7, wherein from 4 to 6 atom equivalents of the alkali metal are used for the preparation of compounds of formula I, wherein  $m$  is 2, and 2 to 3 atom equivalents of the alkali metal are used for the preparation of compounds of formula I, wherein  $m$  is 1.
9. A process according to either claim 1 or claim 2, wherein  $Y$  in the compounds of formula III is chloro.
10. A process according to either claim 1 or claim 2, which comprises carrying out the reaction (1) in the presence of a catalyst, preferably naphthalene or biphenyl.
11. A process according to either claim 1 or claim 2, which comprises carrying out the reaction (1) of the organic phosphorus halides (II) with an alkali metal in the temperature range from  $-20^\circ$  to  $+120^\circ\text{C}$ .
12. A process according to either claim 1 or claim 2, which comprises carrying out the reaction (1) of the organic phosphorus halides (II) with magnesium in combination with an alkali metal in the temperature range from  $80^\circ$  to  $120^\circ\text{C}$ .
13. A process according to either claim 1 or claim 2, wherein the reaction (2) of the metallised phosphine with the acid chloride (III) is carried out at  $-20^\circ$  to  $+80^\circ\text{C}$ .
14. A process according to either claim 1 or claim 2, wherein the reaction steps (1) and (2) are carried out in the same solvent, preferably in tetrahydrofuran.

15. A process according to either claim 1 or claim 2, wherein, in formula I, n is 1, m is 1 or 2, R<sub>1</sub> is phenyl which is unsubstituted or substituted by C<sub>1</sub>-C<sub>4</sub>alkyl or C<sub>1</sub>-C<sub>8</sub>alkoxy, or R<sub>1</sub> is C<sub>1</sub>-C<sub>12</sub>alkyl; R<sub>2</sub> is phenyl which is substituted by halogen, C<sub>1</sub>-C<sub>4</sub>alkoxy or C<sub>1</sub>-C<sub>4</sub>alkyl; and R<sub>3</sub> is unsubstituted or C<sub>1</sub>-C<sub>4</sub>alkyl-substituted phenyl.

16. A compound obtained by the process according to either claim 1 or claim 2.